PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL SEARCHING AUTHORITY

To:
HEWLETT-PACKARD LIMITED
Intellectual Property Section
Attn. Squibbs, Robert F.
Filton Road
Stoke Gifford
Bristol BS34 8QZ
UNITED KINGDOM

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 30003034 WO	Date of mailing *(day/month/year)* 23/11/2001
International application No. PCT/GB 01/02291	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
Applicant HEWLETT-PACKARD COMPANY et al.	International filing date *(day/month/year)* 23/05/2001

1. [X] The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Fascimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Véronique Cornudet-Henschel

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped),whether

(i) the claim is unchanged;

(ii) the claim is cancelled;

(iii) the claim is new;

(iv) the claim replaces one or more claims as filed;

(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international appplication is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
/GB 01/02291

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5922073	A	13-07-1999	JP	9190236 A	22-07-1997
WO 9825433	A	11-06-1998	US	6011973 A	04-01-2000
			AU	735117 B2	28-06-2001
			AU	5368298 A	29-06-1998
			BR	9713870 A	14-03-2000
			GB	2334859 A ,B	01-09-1999
			WO	9825433 A1	11-06-1998
WO 9857518	A	17-12-1998	AU	7799798 A	30-12-1998
			BR	9809991 A	01-08-2000
			GB	2342821 A	19-04-2000
			WO	9857518 A1	17-12-1998
US 5243652	A	07-09-1993	WO	9408408 A1	14-04-1994

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
30003034 WO		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 01/ 02291	23/05/2001	24/05/2000
Applicant		
HEWLETT-PACKARD COMPANY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 7

   [X] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

In order to restrict access to content data held on a removable data carrier (83) or included in an electronic file, equipment (80, 90) for accessing this content is arranged only to be enabled upon a location condition being satisfied. This condition is tested for by obtaining current-location data representing the current location of the equipment, and comparing the current-location data with authorised-location data representing a predetermined authorised location or locality for operation of the equipment. The authorized location data may be stored in the equipment itself, in a remote system (40), or in the removable data carrier or received data file.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 01/02291

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F1/00 H04Q7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 922 073 A (SHIMADA KAZUTOSHI) 13 July 1999 (1999-07-13)	1-3,12, 13, 15-17,19
A	column 3, line 34 -column 4, line 44; figures 1,2 column 5, line 11-46; figure 5 column 6, line 12-31; figure 11 column 6, line 48 -column 7, line 19; figure 13 column 7, line 20-40; figures 14,15 column 11, line 22-25	4-11

X	WO 98 25433 A (ERICSSON GE MOBILE INC) 11 June 1998 (1998-06-11)	1-4,7,9, 15
A	page 3, line 28 -page 5, line 14; figure 1 page 8, line 6-22; figure 3	5,6,8, 10,11

	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 November 2001	23/11/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Möll, H-P

2

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 01/02291

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X A	WO 98 57518 A (ERICSSON GE MOBILE INC) 17 December 1998 (1998-12-17) page 5, line 4 -page 6, line 13; figure 2 page 6, line 14-30; figure 3	1,4-7, 9-11,15 2,3,8
X A	US 5 243 652 A (TEARE MELVIN J ET AL) 7 September 1993 (1993-09-07) column 1, line 65 -column 2, line 49; figure 1 column 3, line 19-38 abstract	1,4,7,9, 14,15 18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 01/02291

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5922073	A	13-07-1999	JP	9190236 A	22-07-1997
WO 9825433	A	11-06-1998	US	6011973 A	04-01-2000
			AU	735117 B2	28-06-2001
			AU	5368298 A	29-06-1998
			BR	9713870 A	14-03-2000
			GB	2334859 A ,B	01-09-1999
			WO	9825433 A1	11-06-1998
WO 9857518	A	17-12-1998	AU	7799798 A	30-12-1998
			BR	9809991 A	01-08-2000
			GB	2342821 A	19-04-2000
			WO	9857518 A1	17-12-1998
US 5243652	A	07-09-1993	WO	9408408 A1	14-04-1994

EL652176463US

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference *(if desired) (12 characters maximum)* 30003034 WO

Box No. I TITLE OF INVENTION

LOCATION-BASED DATA ACCESS CONTROL

Box No. II APPLICANT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

Hewlett-Packard Company
A Delaware Corporation
3000 Hanover Street
Palo Alto, California 94304
USA

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State *(that is, country)* of nationality: US

State *(that is, country)* of residence: US

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

CROUCH, Simon Edwin
17 Cranleigh Gardens
Stoke Bishop
Bristol BS9 1HD
GB

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: GB

State *(that is, country)* of residence: GB

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

SQUIBBS, Robert Francis
Hewlett-Packard Limited
Intellectual Property Section
Filton Road
Stoke Gifford
Bristol BS34 8QZ
UK

Telephone No. +44 117 312 8295

Facsimile No. +44 117 312 8941

Teleprinter No.

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

VICKERS, Paul
6 Edward Road West
Clevedon
Somerset, BS21 7DY
GB

This person is:
- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: GB

State *(that is, country)* of residence: GB

This person is applicant for the purposes of:
- ☐ all designated States
- ☐ all designated States except the United States of America
- ☒ the United States of America only
- ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

WATERS, John Deryk
35 Priory Close
Combe Down
Bath BA2 5AN
GB

This person is:
- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: GB

State *(that is, country)* of residence: GB

This person is applicant for the purposes of:
- ☐ all designated States
- ☐ all designated States except the United States of America
- ☒ the United States of America only
- ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

THOMAS, Andrew
936 Lundy Lane Apt. A
Los Altos, California 94024-5940
US

This person is:
- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: GB

State *(that is, country)* of residence: US

This person is applicant for the purposes of:
- ☐ all designated States
- ☐ all designated States except the United States of America
- ☒ the United States of America only
- ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

McDONNELL, James Thomas Edward
11 Beaufort Road
Clifton
Bristol BS8 2JU
GB

This person is:
- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: GB

State *(that is, country)* of residence: GB

This person is applicant for the purposes of:
- ☐ all designated States
- ☐ all designated States except the United States of America
- ☒ the United States of America only
- ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

Box No. V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked)*:

Regional Patent

- ☐ **AP** **ARIPO Patent:** **GH** Ghana, **GM** Gambia, **KE** Kenya, **LS** Lesotho, **MW** Malawi, **SD** Sudan, **SL** Sierra Leone, **SZ** Swaziland, **TZ** United Republic of Tanzania, **UG** Uganda, **ZW** Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☐ **EA** **Eurasian Patent:** **AM** Armenia, **AZ** Azerbaijan, **BY** Belarus, **KG** Kyrgyzstan, **KZ** Kazakhstan, **MD** Republic of Moldova, **RU** Russian Federation, **TJ** Tajikistan, **TM** Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP** **European Patent:** **AT** Austria, **BE** Belgium, **CH and LI** Switzerland and Liechtenstein, **CY** Cyprus, **DE** Germany, **DK** Denmark, **ES** Spain, **FI** Finland, **FR** France, **GB** United Kingdom, **GR** Greece, **IE** Ireland, **IT** Italy, **LU** Luxembourg, **MC** Monaco, **NL** Netherlands, **PT** Portugal, **SE** Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☐ **OA** **OAPI Patent:** **BF** Burkina Faso, **BJ** Benin, **CF** Central African Republic, **CG** Congo, **CI** Côte d'Ivoire, **CM** Cameroon, **GA** Gabon, **GN** Guinea, **GW** Guinea-Bissau, **ML** Mali, **MR** Mauritania, **NE** Niger, **SN** Senegal, **TD** Chad, **TG** Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired, specify on dotted line)* . . . . . .

National Patent *(if other kind of protection or treatment desired, specify on dotted line)*:

- ☐ **AE** United Arab Emirates
- ☐ **AL** Albania . . . . . .
- ☐ **AM** Armenia . . . . . .
- ☐ **AT** Austria . . . . . .
- ☐ **AU** Australia . . . . . .
- ☐ **AZ** Azerbaijan
- ☐ **BA** Bosnia and Herzegovina . . . . . .
- ☐ **BB** Barbados
- ☐ **BG** Bulgaria . . . . . .
- ☐ **BR** Brazil . . . . . .
- ☐ **BY** Belarus . . . . . .
- ☐ **CA** Canada
- ☐ **CH** and **LI** Switzerland and Liechtenstein
- ☐ **CN** China . . . . . .
- ☐ **CR** Costa Rica . . . . . .
- ☐ **CU** Cuba . . . . . .
- ☐ **CZ** Czech Republic . . . . . .
- ☐ **DE** Germany . . . . . .
- ☐ **DK** Denmark . . . . . .
- ☐ **DM** Dominica
- ☐ **EE** Estonia . . . . . .
- ☐ **ES** Spain . . . . . .
- ☐ **FI** Finland . . . . . .
- ☐ **GB** United Kingdom
- ☐ **GD** Grenada
- ☐ **GE** Georgia . . . . . .
- ☐ **GH** Ghana . . . . . .
- ☐ **GM** Gambia
- ☐ **HR** Croatia . . . . . .
- ☐ **HU** Hungary . . . . . .
- ☐ **ID** Indonesia
- ☐ **IL** Israel . . . . . .
- ☐ **IN** India . . . . . .
- ☐ **IS** Iceland
- ☒ **JP** Japan . . . . . .
- ☐ **KE** Kenya . . . . . .
- ☐ **KG** Kyrgyzstan . . . . . .
- ☐ **KP** Democratic People's Republic of Korea . . . . . .
- ☐ **KR** Republic of Korea . . . . . .
- ☐ **KZ** Kazakhstan . . . . . .
- ☐ **LC** Saint Lucia
- ☐ **LK** Sri Lanka
- ☐ **LR** Liberia
- ☐ **LS** Lesotho . . . . . .
- ☐ **LT** Lithuania
- ☐ **LU** Luxembourg
- ☐ **LV** Latvia
- ☐ **MA** Morocco . . . . . .
- ☐ **MD** Republic of Moldova . . . . . .
- ☐ **MG** Madagascar . . . . . .
- ☐ **MK** The former Yugoslav Republic of Macedonia . . . . . .
- ☐ **MN** Mongolia
- ☐ **MW** Malawi . . . . . .
- ☐ **MX** Mexico . . . . . .
- ☐ **NO** Norway
- ☐ **NZ** New Zealand . . . . . .
- ☐ **PL** Poland . . . . . .
- ☐ **PT** Portugal . . . . . .
- ☐ **RO** Romania
- ☐ **RU** Russian Federation . . . . . .
- ☐ **SD** Sudan
- ☐ **SE** Sweden
- ☐ **SG** Singapore
- ☐ **SI** Slovenia . . . . . .
- ☐ **SK** Slovakia . . . . . .
- ☐ **SL** Sierra Leone . . . . . .
- ☐ **TJ** Tajikistan . . . . . .
- ☐ **TM** Turkmenistan . . . . . .
- ☐ **TR** Turkey . . . . . .
- ☐ **TT** Trinidad and Tobago . . . . . .
- ☐ **TZ** United Republic of Tanzania
- ☐ **UA** Ukraine . . . . . .
- ☐ **UG** Uganda . . . . . .
- ☒ **US** United States of America . . . . . .
- ☐ **UZ** Uzbekistan . . . . . .
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Box No. VI PRIORITY CLAIM ☐ Further priority claim indicated in the Supplemental Box.

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is: national application: country	regional application:* regional Office	international application: receiving Office
item (1) 24th May 2000	0012445.3	GB		
item (2)				
item (3)				

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This international application contains the following number of sheets:

request	: 4
description (excluding sequence listing part)	: 16
claims	: 5
abstract	: 1
drawings	: 4
sequence listing part of description	:
Total number of sheets	: 30

This international application is **accompanied** by the item(s) marked below:

1. ☒ fee calculation sheet
2. ☐ separate signed power of attorney
3. ☒ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☒ priority document(s) identified in Box No. VI as item(s):
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Figure of the drawings which should accompany the abstract: 7

Language of filing of the international application: English

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R. F. Squibbs

Robert Francis Squibbs

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(71) Applicant *(for all designated States except US)*: **HEWLETT-PACKARD COMPANY** [US/US]; 3000 Hanover Street, Palo Alto, CA 94304 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **CROUCH, Simon, Edwin** [GB/GB]; 17 Cranleigh Gardens, Stoke Bishop, Bristol BS9 1HD (GB). **VICKERS, Paul** [GB/GB]; 6 Edward Road West, Clevedon, Somerset, BS21 7DY (GB). **WATERS, John, Deryk** [GB/GB]; 35 Priory Close, Combe Down, Bath BA2 5AN (GB). **THOMAS, Andrew** [GB/US]; 936 Lundy Lane Apt. A, Los Altos, CA 94024-5940 (US). **MCDONNELL, James, Thomas, Edward** [GB/GB]; 11 Beaufort Road, Clifton, Bristol BS8 2JU (GB).

(74) Agent: **SQUIBBS, Robert, Francis**; Hewlett-Packard Limited, Intellectual Property Section, Filton Road, Stoke Gifford, Bristol BS34 8QZ (GB).

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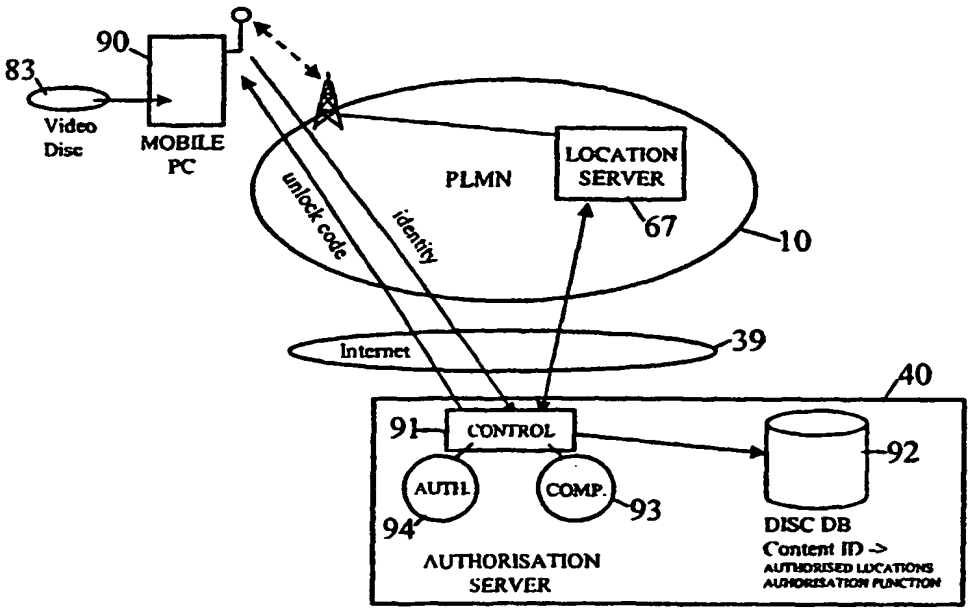
(54) Title: LOCATION-BASED DATA ACCESS CONTROL



(57) Abstract: In order to restrict access to content data held on a removable data carrier (83) or included in an electronic file, equipment (70) for accessing this content is arranged only to be enabled upon a location condition being satisfied. This condition is tested for by obtaining current-location data (67) representing the current location of the equipment, and comparing the current-location data with authorised-location data representing a predetermined authorised location or locality for operation of the equipment. The authorized location data may be stored in the equipment itself, in a remote system (42), or in the removable data media or received data file.

WO 01/91479 A2

Location-Based Data Access Control

Field of the Invention

The present invention relates to location-based control of the access to data stored on a removable data carrier or contained in a received data file.

Background of the Invention

Communication infrastructures suitable for mobile users (in particular, though not exclusively, cellular radio infrastructures) have now become widely adopted. Whilst the primary driver has been mobile telephony, the desire to implement mobile data-based services over these infrastructures, has led to the rapid development of data-capable bearer services across such infrastructures. This has opened up the possibility of many Internet-based services being available to mobile users.

By way of example, Figure 1 shows one form of known communication infrastructure for mobile users providing both telephony and data-bearer services. In this example, a mobile entity 20, provided with a radio subsystem 22 and a phone subsystem 23, communicates with the fixed infrastructure of GSM PLMN (Public Land Mobile Network) 10 to provide basic voice telephony services. In addition, the mobile entity 20 includes a data-handling subsystem 25 interworking, via data interface 24, with the radio subsystem 22 for the transmission and reception of data over a data-capable bearer service provided by the PLMN; the data-capable bearer service enables the mobile entity 20 to communicate with a service system 40 connected to the public Internet 39. The data handling subsystem 25 supports an operating environment 26 in which applications run, the operating environment including an appropriate communications stack.

More particularly, the fixed infrastructure 10 of the GSM PLMN comprises one or more Base Station Subsystems (BSS) 11 and a Network and Switching Subsystem NSS 12. Each BSS 11 comprises a Base Station Controller (BSC) 14 controlling multiple Base Transceiver Stations (BTS) 13 each associated with a respective "cell" of the radio network. When active, the radio subsystem 22 of the mobile entity 20 communicates via a

radio link with the BTS 13 of the cell in which the mobile entity is currently located. As regards the NSS 12, this comprises one or more Mobile Switching Centers (MSC) 15 together with other elements such as Visitor Location Registers 32 and Home Location Register 32.

When the mobile entity 20 is used to make a normal telephone call, a traffic circuit for carrying digitised voice is set up through the relevant BSS 11 to the NSS 12 which is then responsible for routing the call to the target phone (whether in the same PLMN or in another network).

With respect to data transmission to/from the mobile entity 20, in the present example three different data-capable bearer services are depicted though other possibilities exist. A first data-capable bearer service is available in the form of a Circuit Switched Data (CSD) service; in this case a full traffic circuit is used for carrying data and the MSC 32 routes the circuit to an InterWorking Function IWF 34 the precise nature of which depends on what is connected to the other side of the IWF. Thus, IWF could be configured to provide direct access to the public Internet 39 (that is, provide functionality similar to an IAP - Internet Access Provider IAP). Alternatively, the IWF could simply be a modem connecting to a PSTN; in this case, Internet access can be achieved by connection across the PSTN to a standard IAP.

A second, low bandwidth, data-capable bearer service is available through use of the Short Message Service that passes data carried in signalling channel slots to an SMS unit which can be arranged to provide connectivity to the public Internet 39.

A third data-capable bearer service is provided in the form of GPRS (General Packet Radio Service which enables IP (or X.25) packet data to be passed from the data handling system of the mobile entity 20, via the data interface 24, radio subsystem 21 and relevant BSS 11, to a GPRS network 17 of the PLMN 10 (and vice versa). The GPRS network 17 includes a SGSN (Serving GPRS Support Node) 18 interfacing BSC 14 with the network 17, and a GGSN (Gateway GPRS Support Node) interfacing the network 17 with an external network (in this example, the public Internet 39). Full details of GPRS can be found in the

ETSI (European Telecommunications Standards Institute) GSM 03.60 specification. Using GPRS, the mobile entity 20 can exchange packet data via the BSS 11 and GPRS network 17 with entities connected to the public Internet 39.

The data connection between the PLMN 10 and the Internet 39 will generally be through a firewall 35 with proxy and/or gateway functionality.

Different data-capable bearer services to those described above may be provided, the described services being simply examples of what is possible.

In Figure 1, a service system 40 is shown connected to the Internet 40, this service system being accessible to the OS/application 26 running in the mobile entity by use of any of the data-capable bearer services described above. The data-capable bearer services could equally provide access to a service system that is within the domain of the PLMN operator or is connected to another public or private data network.

With regard to the OS/application software 26 running in the data handling subsystem 25 of the mobile entity 20, this could, for example, be a WAP application running on top of a WAP stack where "WAP" is the Wireless Application Protocol standard. Details of WAP can be found, for example, in the book "Official Wireless Application Protocol" Wireless Application Protocol Forum, Ltd published 1999 Wiley Computer Publishing. Where the OS/application software is WAP compliant, the firewall will generally also serve as a WAP proxy and gateway. Of course, OS/application 26 can comprise other functionality (for example, an e-mail client) instead of, or additional to, the WAP functionality.

The mobile entity 20 may take many different forms. For example, it could be two separate units such as a mobile phone (providing elements 22-24) and a mobile PC (data-handling system 25) coupled by an appropriate link (wireline, infrared or even short range radio system such as Bluetooth). Alternatively, mobile entity 20 could be a single unit such as a mobile phone with WAP functionality. Of course, if only data transmission/reception is required (and not voice), the phone functionality 24 can be omitted; an example of this is a PDA with built-in GSM data-capable functionality whilst another example is a digital

camera (the data-handling subsystem) also with built-in GSM data-capable functionality enabling the upload of digital images from the camera to a storage server.

Whilst the above description has been given with reference to a PLMN based on GSM technology, it will be appreciated that many other cellular radio technologies exist and can typically provide the same type of functionality as described for the GSM PLMN 10.

Recently, much interest has been shown in "location-based", "location-dependent", or "location-aware" services for mobile users, these being services that take account of the current location of the user (or other mobile party). The most basic form of this service is the emergency location service whereby a user in trouble can press a panic button on their mobile phone to send an emergency request-for-assistance message with their location data appended. Another well known location-based service is the provision of traffic and route-guiding information to vehicle drivers based on their current position. A further known service is a "yellow pages" service where a user can find out about amenities (shops, restaurants, theatres, etc.) local to their current location. The term "location-aware services" will be used herein to refer generically to these and similar services where a location dependency exists.

Location-aware services all require user location as an input parameter. A number of methods already exist for determining the location of a mobile user as represented by an associated mobile equipment. Example location-determining methods will now be described with reference to Figures 2 to 5. As will be seen, some of these methods result in the user knowing their location thereby enabling them to transmit it to a location-aware service they are interested in receiving, whilst other of the methods result in the user's location becoming known to a network entity from where it can be supplied directly to a location-aware service (generally only with the consent of the user concerned). It is to be understood that additional methods to those illustrated in Figures 2 to 5 exist.

As well as location determination, Figures 2 to 5 also illustrate how the mobile entity requests a location-aware service provided by service system 40. In the present examples,

the request is depicted as being passed over a cellular mobile network (PLMN 10) to the service system 40. The PLMN is, for example, similar to that depicted in Figure 1 with the service request being made using a data-capable bearer service of the PLMN. The service system 40 may be part of the PLMN itself or connected to it through a data network such as the public Internet. It should, however, be understood that infrastructure other than a cellular network may alternatively be used for making the service request

The location-determining method illustrated in Figure 2 uses an inertial positioning system 50 provided in the mobile entity 20A, this system 50 determining the displacement of the mobile entity from an initial reference position. When the mobile entity 20A wishes to invoke a location-aware service, it passes its current position to the corresponding service system 40 along with the service request 51. This approach avoids the need for an infrastructure to provide an external frame of reference; however, cost, size and long-term accuracy concerns currently make such systems unattractive for incorporation into mass-market handheld devices.

Figure 3 shows two different location-determining methods both involving the use of local, fixed-position, beacons here shown as infra-red beacons IRD though other technologies, such as short-range radio systems (in particular, "Bluetooth" systems) may equally be used. The right hand half of Figure 3 show a number of independent beacons 55 that continually transmit their individual locations. Mobile entity 20B is arranged to pick up the transmissions from a beacon when sufficiently close, thereby establishing its position to the accuracy of its range of reception. This location data can then be appended to a request 59 made by the mobile entity 20B to a location-aware service available from service system 40. A variation on this arrangement is for the beacons 55 to transmit information which whilst not directly location data, can be used to look up such data (for example, the data may be the Internet home page URL of a store housing the beacon 55 concerned, this home page giving the store location - or at least identity, thereby enabling look-up of location in a directory service).

In the left-hand half of Figure 3, the IRB beacons 54 are all connected to a network that connects to a location server 57. The beacons 54 transmit a presence signal and when

mobile entity 20C is sufficiently close to a beacon to pick up the presence signal, it responds by sending its identity to the beacon. (Thus, in this embodiment, both the beacons 54 and mobile entity 20C can both receive and transmit IR signals whereas beacons 55 only transmit, and mobile entity 20B only receives, IR signals). Upon a beacon 54 receiving a mobile entity's identity, it sends out a message over network 56 to location server 57, this message linking the identity of the mobile entity 20C to the location of the relevant beacon 54. Now when the mobile entity wishes to invoke a location-aware service provided by the service system 40, since it does not know its location it must include it's identity in the service request 58 and rely on the service system 40 to look up the current location of the mobile entity in the location server 57. Because location data is personal and potentially very sensitive, the location server 57 will generally only supply location data to the service system 40 after the latter has produced an authorizing token supplied by the mobile entity 20B in request 58. It will be appreciated that whilst service system 40 is depicted as handling service requests form both types of mobile entity 20 B and 20C, separate systems 40 may be provided for each mobile type (this is likewise true in respect of the service systems depicted in Figures 4 and 5).

Figure 4 depicts several forms of GPS location-determining system. On the left-hand side of Figure 4, a mobile entity 20D is provided with a standard GPS module and is capable of determining the location of entity 20D by picking up signals from satellites 60. The entity 20D can then supply this location when requesting, in request 61, a location-aware service from service system 40.

The right-hand side of Figure 4 depicts, in relation to mobile entity 20E, two ways in which assistance can be provided to the entity in deriving location from GPS satellites. Firstly, the PLMN 10 can be provided with fixed GPS receivers 62 that each continuously keep track of the satellites 60 visible from the receiver and pass information in messages 63 to local mobile entities 20E as to where to look for these satellites and estimated signal arrival times; this enables the mobile entities 20E to substantially reduce acquisition time for the satellites and increase accuracy of measurement (see "Geolocation Technology Pinpoints Wireless 911 calls within 15 Feet" 1-Jul-99 Lucent Technologies, Bell Labs). Secondly, as an alternative enhancement, the processing load on the mobile entity 20E can be reduced

and encoded jitter removed using the services of network entity 64 (in or accessible through PLMN 10).

One the mobile unit 20E has determined its location, it can pass this information in request 65 when invoking a location-aware service provided by service system 40.

Figure 5 depicts two general approaches to location determination from signals present in a cellular radio infrastructure. First, it can be noted that in general both the mobile entity and the network will know the identity of the cell in which the mobile entity currently resides, this information being provided as part of the normal operation of the system. (Although in a system such as GSM, the network may only store current location to a resolution of a collection of cells known as a "location area", the actual current cell ID will generally be derivable from monitoring the signals exchanged between the BSC 14 and the mobile entity). Beyond current basic cell ID, it is possible to get a more accurate fix by measuring timing and/or directional parameters between the mobile entity and multiple BTSs 13, these measurement being done either in the network or the mobile entity (see, for example, International Application WO 99/04582 that describes various techniques for effecting location determination in the mobile and WO 99/55114 that describes location determination by the mobile network in response to requests made by location-aware applications to a mobile location center - server- of the mobile network).

The left-hand half of Figure 5 depicts the case of location determination being done in the mobile entity 20F by, for example, making Observed Time Difference (OTD) measurements with respect to signals from BTSs 13 and calculating location using a knowledge of BTS locations. The location data is subsequently appended to a service request 66 sent to service system 40 in respect of a location-aware service. The calculation load on mobile entity 20F could be reduced and the need for the mobile to know BTS locations avoided, by having a network entity do some of the work. The right-hand half of Figure 5 depicts the case of location determination being done in the network, for example, by making Timing Advance measurements for three BTSs 13 and using these measurements to derive location (this derivation typically being done in a unit associated with BSC 14). The resultant location data is passed to a location server 67 from where it

can be made available to authorised services. As for the mobile entity 20C in Figure 3, when the mobile entity 20G of Figure 5 wishes to invoke a location-aware service available on service system 50, it sends a request 69 including an authorisation token and its ID (possible embedded in the token) to the service system 40; the service system then uses the authorisation token to obtain the current location of the mobile entity 20G from the location server 67.

In the above examples, where the mobile entity is responsible for determining location, this will generally be done only at the time the location-aware service is being requested. Where location determination is done by the infrastructure, it may be practical for systems covering only a limited number of users (such as the system illustrated in the left-hand half of Figure 2 where a number of infrared beacons 54 will cover a generally fairly limited) for location-data collection to be done whenever a mobile entity is newly detected by an IRB, this data being passed to location server 57 where it is cached for use when needed. However, for systems covering large areas with potentially a large number of mobile entities, such as the Figure 5 system, it is more efficient to effect location determination as and when there is a perceived need to do so; thus, location determination may be triggered by the location server 67 in response to the service request 68 from the mobile entity 20G or the mobile entity may, immediately prior to making request 68, directly trigger BSC 14 to effect a location determination and feed the result to location server 67.

Further with respect to the location servers 57, 67, whilst access authorisation by location-aware services has been described as being through authorisation tokens supplied by the mobile entities concerned, other authorisation techniques can be used. In particular, a location-aware service can be prior authorised with the location server in respect of particular mobile entities; in this case, each request from the service for location data needs only to establish that the request comes from a service authorised in respect of the mobile entity for which the location data is requested.

As already indicated, Figures 2 to 5 depict only some examples of how location determination can be achieved, there being many other possible combinations of technology used and where in the system the location-determining measurements are made

and location is calculated, stored and used .Thus, the location-aware service may reside in the mobile entity whose location is of interest, in a network-connected service system 40 (as illustrated), or even in another mobile entity. Furthermore, whilst in the examples of Figures 2 to 5, invocation of the location-aware service has been by the mobile entity whose location is of interest, the nature of the location-aware service may be such that it is invoked by another party (including, potentially, the PLMN itself). In this case, unless the invoking party already knows the location of he mobile entity and can pass this information to the location-aware service (which may, for example, may be situation where the PLMN invokes the service), it is the location-aware service that is responsible for obtaining the required location data, either by sending a request to the mobile entity itself or by requesting the data from a location server. Unless the location server already has the needed information in cache, the server proceeds to obtain the data either by interrogating the mobile entity or by triggering infrastructure elements to locate the mobile. For example, where a location-aware service running on service system 40 in Figure 5 needs to find the location of mobile 20G, it could be arranged to do so by requesting this information from location server 67 which in turn requests the location data from the relevant BSC, the latter then making the necessary determination using measurements from BTSs 13.

Although in the foregoing, the provision of location data through the mobile radio infrastructure to the mobile entity has been treated as a service effected over a data-capable bearer channel, it may be expected that as location data becomes considered a basic element of mobile radio infrastructure services, provision will be made in the relevant mobile radio standards for location data to be passed over a signalling channel to the mobile entity.

It is an object of the present invention to provide an improved way of restricting access to electronic content data by using location information.

Summary of the Invention

According to one aspect of the present invention, there is provided a control method for an item of equipment that is provided with particular functionality for using target data on a removable data carrier or in a received data file, the method involving enabling said

particular functionality upon at least a first location condition being satisfied, this condition being tested for by:

(a) obtaining current-location data representing the current location of the equipment;

(b) comparing the current-location data with authorised-location data that is associated with the target data and represents a predetermined authorised location or locality for operation of said particular functionality of the equipment in relation to the associated target data; and

(c) generating a location-match signal upon the comparison step (b) indicating that the equipment is currently located in said authorised location or locality.

According to a second aspect of the present invention, there is provided equipment including particular functionality for using target data provided on a removable data carrier or in a received data file, the equipment further including a control sub-system for enabling said particular functionality upon at least a first location condition being satisfied, the control sub-system comprising, for testing this condition,:

- a location discovery arrangement for obtaining current-location data representing the current location of the equipment;
- a read arrangement for reading from the removable data carrier or received data file authorized-location data representing a predetermined authorized location or locality for operation of said particular functionality of the equipment; and
- a comparison arrangement for comparing the current-location data with the authorized-location data whereby to generate a location-match signal upon this comparison indicating that the equipment is currently located in said authorised location or locality.

According to a third aspect of the present invention, there is provided equipment including particular functionality for using target data provided on a removable data carrier or in a received data file, the equipment further including a control sub-system for enabling said particular functionality upon at least a first location condition being satisfied, the control sub-system comprising, for testing this condition,:

- a location discovery arrangement for obtaining current-location data representing the current location of the equipment;

- a store for storing in association with identity data, authorized-location data representing a predetermined authorized location or locality for operation of said particular functionality of the equipment
- a read arrangement for reading from the removable data carrier or received data file identity information relating to the target data;
- a data retrieval arrangement for using the identity information to access the authorized-location data held in said store in respect of the identity data matching the identity information; and
- a comparison arrangement for comparing the current-location data with the accessed authorized-location data whereby to generate a location-match signal upon this comparison indicating that the equipment is currently located in said authorised location or locality.

According to a fourth aspect of the present invention, there is provided a service system for determining when an item of equipment is located at a location where particular functionality of the equipment is authorised for use in accessing target data provided on a removable data carrier or in a received data file, the service system comprising:

- a communications sub-system for communicating with said equipment both to receive therefrom identity information concerning said target data, and to return to the equipment enablement signals for enabling said particular functionality for accessing the target data;
- a location discovery arrangement for obtaining current-location data representing the current location of the equipment;
- a store for storing in association with identity data, authorized-location data representing a predetermined authorized location or locality for operation of said particular functionality of the equipment;
- a data retrieval arrangement for using identity information received from the equipment via the communication sub-system to access the authorized-location data held in said store in respect of identity data matches the identity information; and
- a comparison arrangement for comparing the current-location data with the accessed authorized-location data whereby to generate a location-match signal upon this

comparison indicating that the equipment is currently located in said authorised location or locality.

According to a fifth aspect of the present invention, there is provided a removable data carrier on which is registered target content data and authorised-location data, the latter representing a predetermined authorized location or locality where access to the target data is permitted.

Brief Description of the Drawings

A method and service-system, both embodying the present invention, for location-based equipment control, will now be described, by way of non-limiting example, with reference to the accompanying diagrammatic drawings, in which:

- **Figure 1** is a diagram of a known communications infrastructure usable for transferring voice and data to/from a mobile entity;
- **Figure 2** is a diagram illustrating one known approach to determining the location of a mobile entity, this approach involving providing the entity with an inertial positioning system;
- **Figure 3** is a diagram illustrating another known approach to determining the location of a mobile entity, this approach being based on proximity of the mobile entity to fixed-position local beacons;
- **Figure 4** is a diagram illustrating a further known approach to determining the location of a mobile entity, this approach involving the use of GPS satellites;
- **Figure 5** is a diagram illustrating a still further approach to determining the location of a mobile entity, this approach being based on the use of signals present in a cellular mobile radio communications system;
- **Figure 6** is a diagram illustrating a first embodiment of the invention , this embodiment involving a removable data carrier; and
- **Figure 7** is a diagram illustrating a second embodiment of the invention, this embodiment also involving a removable data carrier.

Best Mode of Carrying Out the Invention

In certain situations it can be desirable to be able to restrict access to certain information media and data files such that they could only be read at particular locations (inside a secure building, for example). As will be described below, embodiments of the present invention provide ways of achieving this objective by deriving the location of the equipment used to access the information media / data files concerned and comparing this location with predetermined authorized-locations data that specifies where the equipment, or where the media/file, are authorized for use. Where this comparison determines that the equipment (or at least one function of the equipment) can legitimately be used, appropriate enablement signals are generated to enable the corresponding equipment functions.

Current location data about the equipment may be derived by the equipment itself or by a communications infrastructure (e.g. cellular radio network) with which the equipment communicates. As regards the authorised-locations data, this can be:

- held in the equipment (and potentially modifiable under password control);
- embedded in "content" (removable information media, received data file) which the equipment is intended to process in some way at authorised locations;
- held at a remote server to which the equipment must refer; in this case, a reference identifying what authorised-locations data is relevant must be passed to the server (this reference could identify the equipment, a particular user, or the "content" concerned). The identifying reference may be provided from the equipment itself or from the communications infrastructure if known to the latter (which may well be the case if the reference concerns the identity of the equipment or user).

The comparison of equipment current location and the authorized location data can be effected at the equipment itself or at a remote authorization server; in this latter case, the server returns an authorization code only when the equipment location corresponds to the authorized location data.

Conditions additional to location can also be set on equipment enablement.

Figure 6 illustrates a first embodiment of the invention in which a mobile device 80, such as a mobile PC, is only enabled to display a video disc 83 at an authorized location that is

stored on the disc itself. The mobile device 80 includes playback functionality 81 that requires the presence of an enable signal on line 82 for it to display the contents of the disc. Playback functionality includes a location reader 84 operative (regardless of whether or not the enable signal is present) to read the authorized-location data off the disc 83 and pass it to a comparison unit 86 to which is also fed the current location of the device 20 as provided by a GPS system 85. Comparison unit 82 only generates the enable signal when the device current location corresponds to the authorized location data on the disc 83. Preferably, the video disc is encoded in a format that is only interpretable by devices having the location checking functionality built in. The relevant parts of device 80 are preferably of tamper-proof construction so as to prevent an end-user circumventing the location condition placed on access to the target information on the video disc.

Figure 7 illustrates another embodiment where a mobile device 90, such as a mobile PC, is only enabled to decrypt and display a video disc 83 at a location specified in a database 92 associated with an authorisation server 40. The mobile device is equipped with cellular radio functionality enabling it to communicate with the server 40 using a data-capable bearer service of PLMN 10. The identity of the contents of the video disc 83 is read from the disc by the mobile device 90 and supplied to the authorisation server 40. Control process 91 obtains the current location of the mobile device from location server 67 of PLMN 10 and looks up the authorized location of playback of the contents of the video disc 83 by using the disc-contents identity to reference into database 92. Comparison process 93 compares the current device location with the authorized location. If the server finds that an authorized read location for the video-disc contents matches the current location of the mobile device, process 94 returns an enablement code (which may be a decryption key for the video disc contents, this key being held in database 92). Authorization may additionally be made dependent on the identity of the mobile PC or its user. For security reasons, the enablement code is preferably returned encrypted with a public key associated with the mobile device/user. During playing of the video disc, the content identity is arranged to be repeatedly read by device 90 so as to prevent the viewing of a different disc with different content under the authorisation granted for the original disc (this would only be possible if the discs were not encrypted or were encrypted with the same key).

Instead of a video disc 83, the embodiments of Figures 6 and 7 could equally be used in respect of other forms of removable data carriers or received data files (received, for example, via an internet or intranet connection to the equipment). Furthermore, the equipment used to access the information media / data file need not be portable equipment and could, for example, be normal desktop office or home equipment

It will be appreciated that many different embodiments are possible in view of the variety of ways the location information and authorized-locations data can be derived. Furthermore, the desired level of security may determine the details of any particular implementation (in particular, various authentication techniques may need to be used to avoid location information being falsified).

It may be noted that it is possible to store the authorized-location data for the information media / data file in the equipment to be used for access the latter. This could be useful, for example, in restricting access to classified encrypted electronic documents of a company in dependence on the equipment location and classification level of a current document; to this end, the equipment is pre-programmed by the company with authorized location data (corresponding, for example, to company sites and locations within those sites) to be applied to particular document classification levels (the classification level of a document being stored with that document on the information media/file concerned and being read by the equipment). Thus, if the current location of the equipment is such that it is authorized to read documents of a classification level at least as high as that of a current document, then the equipment is enabled to use an appropriate decryption key (for example, stored in the equipment) for reading that electronic document. In this context, the classification level of the electronic document constitutes its identity.

Whilst in the described embodiments the location data has been expressed in terms of absolute location data, it would be possible also to use relative location data and also semantic location data (for example, the authorised locations could be specified as all premises of a particular company, in which case there would need to be a translation of this

semantic location data to real world locations through, for example, a database that specifies the absolute locations of the company's current premises).

In the Figure 7 embodiment, communication with the authorisation server 40 is described as being via a cellular radio connection. It would, of course, also be possible to used a wired connection (such as a LAN connecting to the Internet) with the current location of the device concerned being obtained by any appropriate manner.

Where a piece of equipment has multiple functional units, different functions of the equipment can be locationally limited to differing extents.

It is to be understood that the present invention is not limited to the specifics of the mobile entity and communication infrastructure and location discovery means shown in Figures 6 and 7, and the generalisations discussed above in relation to Figures 1 to 5 regarding these elements apply equally to the operational context of the described embodiments of the invention. Furthermore, whilst the service system 40 is shown in Figure 7 as connected to the public Internet, it could be connected to a GPRS network 17 of PLMN 10 or to another fixed data network interfacing directly or indirectly with the network 17 or network 39.

CLAIMS

1. A control method for an item of equipment that is provided with particular functionality for using target data on a removable data carrier or in a received data file, the method involving enabling said particular functionality upon at least a first location condition being satisfied, this condition being tested for by:

(a) obtaining current-location data representing the current location of the equipment;

(b) comparing the current-location data with authorised-location data that is associated with the target data and represents a predetermined authorised location or locality for operation of said particular functionality of the equipment in relation to the associated target data; and

(c) generating a location-match signal upon the comparison step (b) indicating that the equipment is currently located in said authorised location or locality.

2. A method according to claim 1, wherein the authorized-location data is stored on said removable data carrier or in said received data file, the equipment reading said information carrier to obtain said authorized-location data.

3. A method according to claim 2, wherein steps (b) and (c) are carried out at the equipment.

4. A method according to claim 2, wherein the equipment has a communication sub-system enabling it to communicate with a remote service system via a communications infrastructure, steps (b) and (c) being carried out at the remote service system and this system, following the generation of a location-match signal in step (c), passing this signal or one produced after testing any further conditions set to be tested at the remote system, to the equipment via said communications infrastructure.

5. A method according to claim 4, wherein the current location data is obtained by the service system from a location discovery system separate from the equipment.

6. A method according to claim 4, wherein the communications infrastructure is a cellular radio infrastructure and the communication sub-system of the equipment is a cellular radio device, the infrastructure having a location discovery system for determining the location of the cellular radio device and thus of the equipment, and the remote service system obtaining said current-location data from the location discovery system either directly or via the equipment.

7. A method according to claim 1, wherein the equipment has a communication sub-system enabling it to communicate with a remote service system via a communications infrastructure, the remote service system storing authorised-location data against identity information, and the equipment reading said data carrier or file to derive identity information which it passes to the service system where it is used to access the corresponding authorized-location data for use in step (b).

8. A method according to claim 7, wherein the authorized location data is returned to the equipment and steps (b) and (c) are carried out at the equipment.

9. A method according to claim 7, wherein steps (b) and (c) are carried out at the service system and this system, following the generation of a location-match signal in step (c), passing this signal or one produced after testing any further conditions set to be tested at the service system, to the equipment via said communications infrastructure.

10. A method according to claim 9, wherein the current location data is obtained by the service system from a separate location discovery system separate from the equipment.

11. A method according to claim 9, wherein the communications infrastructure is a cellular radio infrastructure and the communication sub-system of the equipment is a cellular radio device, the infrastructure having a location discovery system for determining the location of the cellular radio device and thus of the equipment, and the remote service system obtaining said current-location data from the location discovery system either directly or via the equipment.

12. A method according to claim 1, wherein items of authorized-location data are stored in the equipment in association with identity data, the equipment reading said data carrier or file to derive identity information which it then correlates with said identity data to determine the authorized-location data item applicable to the data carrier or file, steps (b) and (c) then being carried out at the equipment using this item of authorized-location data.

13. A method according to claim 12, wherein said identity information identifies a classification of the target data.

14. A method according to claim 1, wherein the target data is encrypted and the enabling of said particular functionality involves providing a decryption key to the functionality to enable it to decrypt said target data.

15. Equipment including particular functionality for using target data provided on a removable data carrier or in a received data file, the equipment further including a control sub-system for enabling said particular functionality upon at least a first location condition being satisfied, the control sub-system comprising, for testing this condition,:

- a location discovery arrangement for obtaining current-location data representing the current location of the equipment;
- a read arrangement for reading from the removable data carrier or received data file authorized-location data representing a predetermined authorised location or locality for operation of said particular functionality of the equipment; and
- a comparison arrangement for comparing the current-location data with the authorized-location data whereby to generate a location-match signal upon this comparison indicating that the equipment is currently located in said authorised location or locality.

16. Equipment including particular functionality for using target data provided on a removable data carrier or in a received data file, the equipment further including a control sub-system for enabling said particular functionality upon at least a first location condition being satisfied, the control sub-system comprising, for testing this condition,:

- a location discovery arrangement for obtaining current-location data representing the current location of the equipment;
- a store for storing in association with identity data, authorized-location data representing a predetermined authorized location or locality for operation of said particular functionality of the equipment
- a read arrangement for reading from the removable data carrier or received data file identity information relating to the target data;
- a data retrieval arrangement for using the identity information to access the authorized-location data held in said store in respect of the identity data matching the identity information; and
- a comparison arrangement for comparing the current-location data with the accessed authorized-location data whereby to generate a location-match signal upon this comparison indicating that the equipment is currently located in said authorised location or locality.

17. A service system for determining when an item of equipment is located at a location where particular functionality of the equipment is authorised for use in accessing target data provided on a removable data carrier or in a received data file, the service system comprising:

- a communications sub-system for communicating with said equipment both to receive therefrom identity information concerning said target data, and to return to the equipment enablement signals for enabling said particular functionality for accessing the target data;
- a location discovery arrangement for obtaining current-location data representing the current location of the equipment;
- a store for storing in association with identity data, authorized-location data representing a predetermined authorized location or locality for operation of said particular functionality of the equipment;
- a data retrieval arrangement for using identity information received from the equipment via the communication sub-system to access the authorized-location data held in said store in respect of identity data matches the identity information; and

a comparison arrangement for comparing the current-location data with the accessed authorized-location data whereby to generate a location-match signal upon this comparison indicating that the equipment is currently located in said authorised location or locality.

18. A service system according to claim 16, wherein the system, following the generation of a location-match signal and successful testing for any further conditions set to be tested at the system, is operative to return to the equipment a decryption key for decrypting said target data.

19. A removable data carrier on which is registered target content data and authorised-location data, the latter representing a predetermined authorized location or locality where access to the target data is permitted.

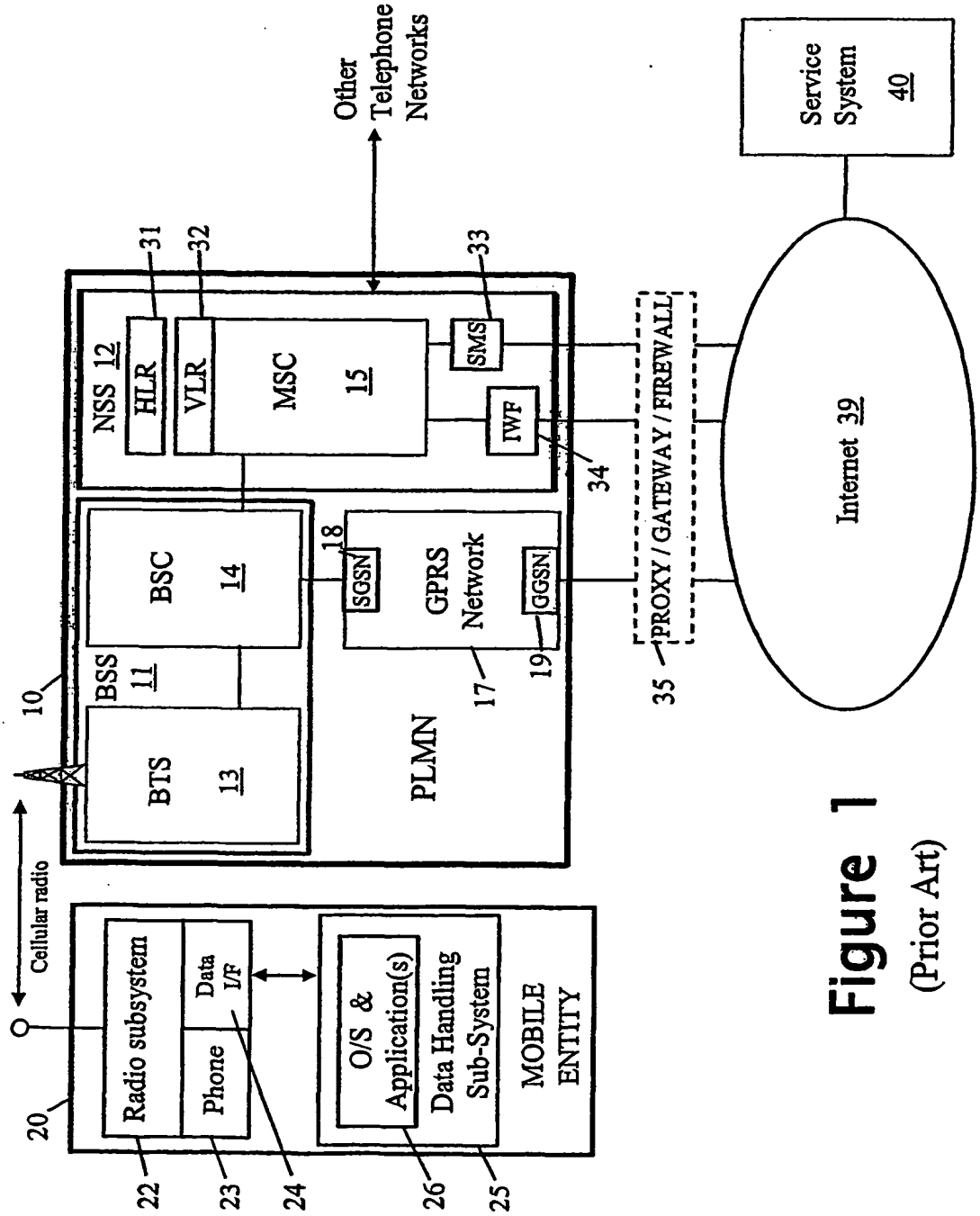


Figure 1
(Prior Art)

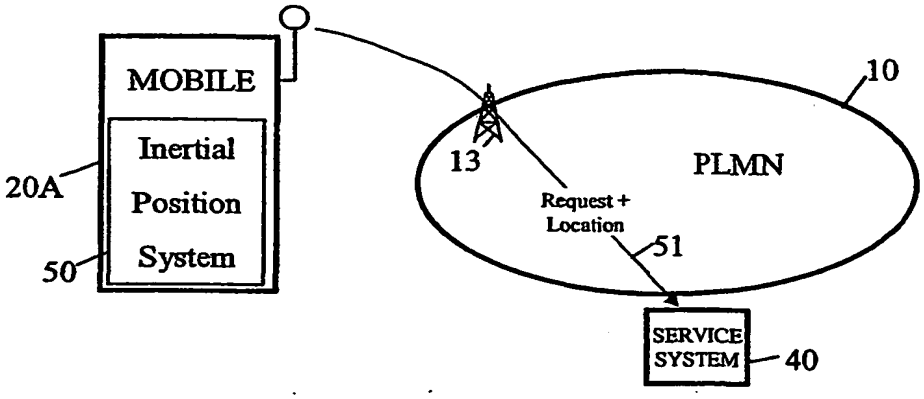


Figure 2

(Prior Art)

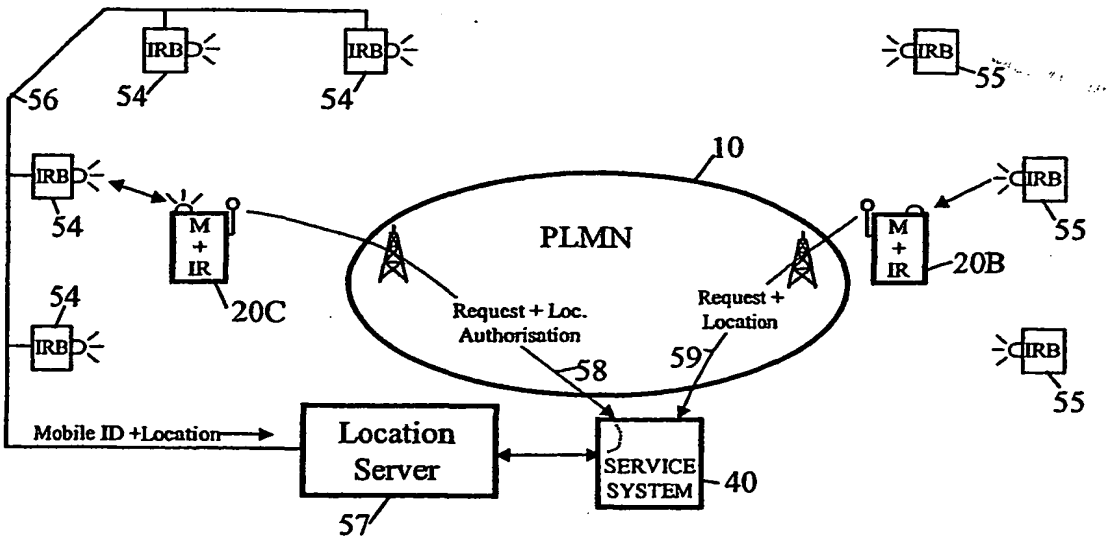


Figure 3

(Prior Art)

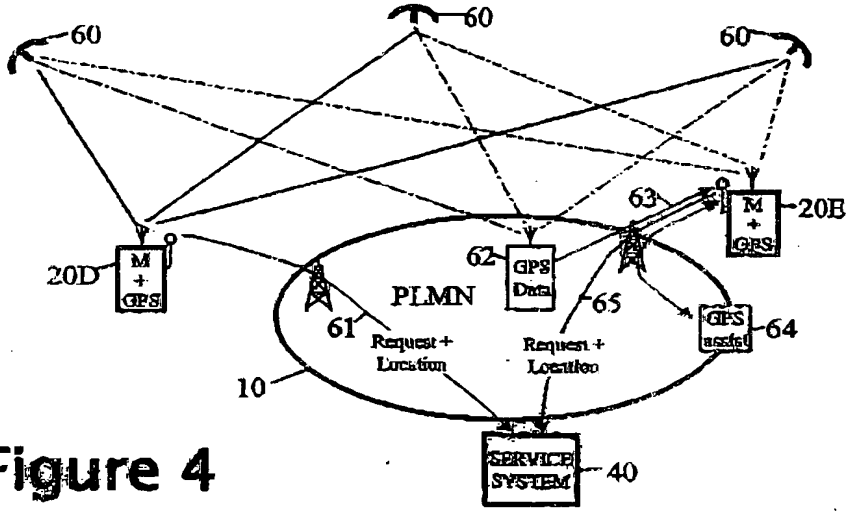


Figure 4

(Prior Art)

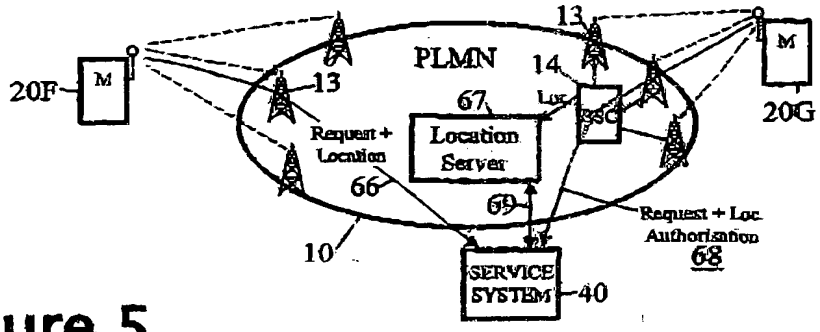


Figure 5

(Prior Art)

Fig. 6

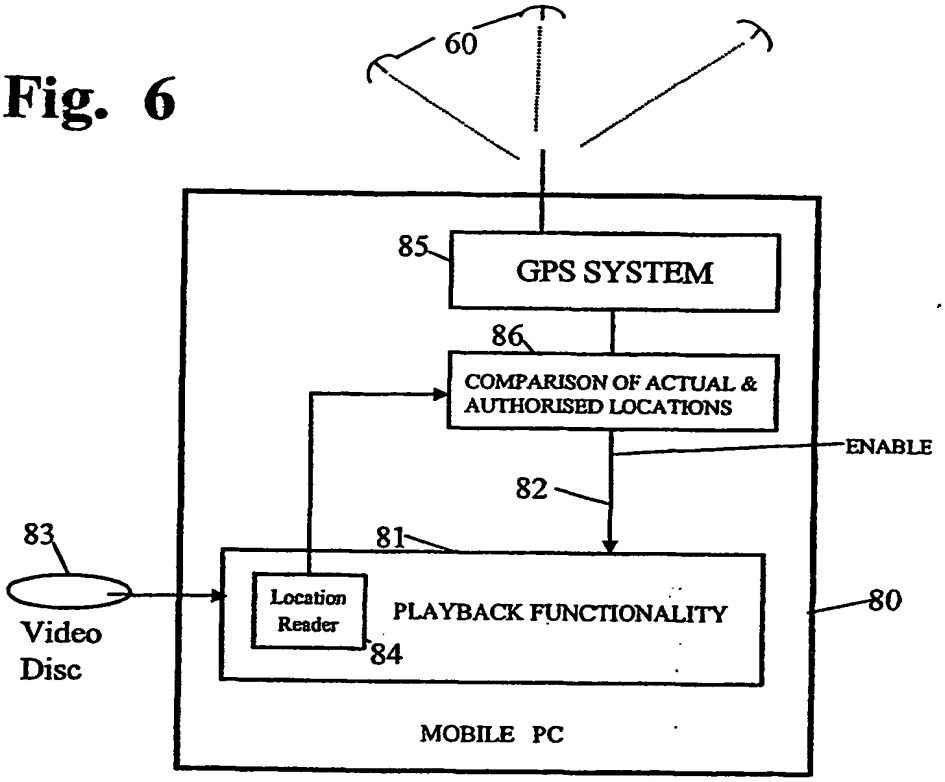
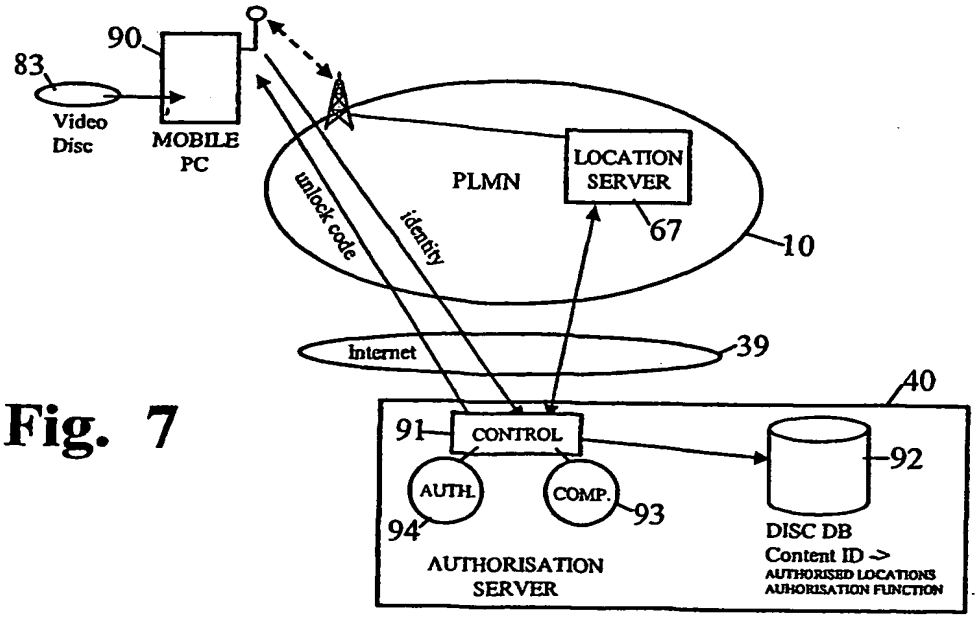

60
85
GPS SYSTEM
86
COMPARISON OF ACTUAL & AUTHORISED LOCATIONS
ENABLE
82
83
81
Location Reader
PLAYBACK FUNCTIONALITY
80
84
Video Disc
MOBILE PC

Fig. 7


90
83
Video Disc
MOBILE PC
PLMN
LOCATION SERVER
67
10
unlock code
identity
Internet
39
40
91
CONTROL
92
AUTH.
COMP.
93
94
AUTHORISATION SERVER
DISC DB
Content ID ->
AUTHORISED LOCATIONS
AUTHORISATION FUNCTION

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(71) Applicant *(for all designated States except US)*: **HEWLETT-PACKARD COMPANY** [US/US]; 3000 Hanover Street, Palo Alto, CA 94304 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **CROUCH, Simon, Edwin** [GB/GB]; 17 Cranleigh Gardens, Stoke Bishop, Bristol BS9 1HD (GB). **VICKERS, Paul** [GB/GB]; 6 Edward Road West, Clevedon, Somerset, BS21 7DY (GB). **WATERS, John, Deryk** [GB/GB]; 35 Priory Close, Combe Down, Bath BA2 5AN (GB). **THOMAS, Andrew** [GB/US]; 936 Lundy Lane Apt. A, Los Altos, CA 94024-5940 (US). **MCDONNELL, James, Thomas, Edward** [GB/GB]; 11 Beaufort Road, Clifton, Bristol BS8 2JU (GB).

(74) Agent: **SQUIBBS, Robert, Francis**; Hewlett-Packard Limited, Intellectual Property Section, Filton Road, Stoke Gifford, Bristol BS34 8QZ (GB).

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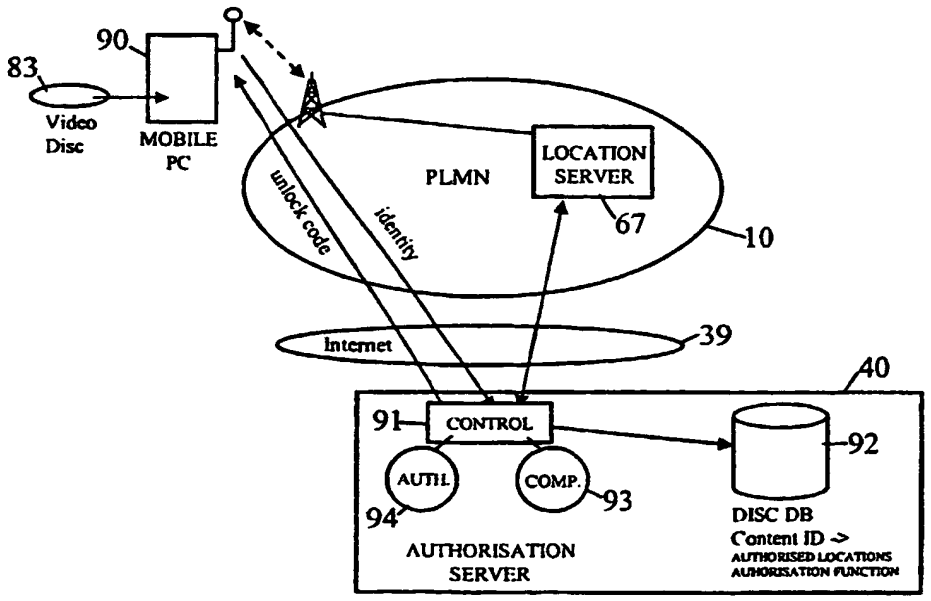
(54) Title: LOCATION-BASED DATA ACCESS CONTROL



(57) Abstract: In order to restrict access to content data held on a removable data carrier (83) or included in an electronic file, equipment (80,90) for accessing this content is arranged only to be enabled upon a location condition being satisfied. This condition is tested for by obtaining current-location data representing the current location of the equipment, and comparing the current-location data with authorised-location data representing a predetermined authorised location or locality for operation of the equipment. The authorized location data may be stored in the equipment itself, in a remote system (40), or in the removable data carrier or received data file.

WO 01/91479 A3

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

[redacted]tional Application No
PCT/GB 01/02291

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 922 073 A (SHIMADA KAZUTOSHI) 13 July 1999 (1999-07-13)	1-3,12, 13, 15-17,19
A	column 3, line 34 -column 4, line 44; figures 1,2 column 5, line 11-46; figure 5 column 6, line 12-31; figure 11 column 6, line 48 -column 7, line 19; figure 13 column 7, line 20-40; figures 14,15 column 11, line 22-25	4-11
X	WO 98 25433 A (ERICSSON GE MOBILE INC) 11 June 1998 (1998-06-11)	1-4,7,9, 15
A	page 3, line 28 -page 5, line 14; figure 1 page 8, line 6-22; figure 3	5,6,8, 10,11

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Möll, H-P

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 01/02291

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	WO 98 57518 A (ERICSSON GE MOBILE INC) 17 December 1998 (1998-12-17) page 5, line 4 -page 6, line 13; figure 2 page 6, line 14-30; figure 3	1,4-7, 9-11,15 2,3,8
X A	US 5 243 652 A (TEARE MELVIN J ET AL) 7 September 1993 (1993-09-07) column 1, line 65 -column 2, line 49; figure 1 column 3, line 19-38 abstract	1,4,7,9, 14,15 18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 01/02291

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
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			AU	735117 B2	28-06-2001
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Location-Based Data Access Control

Field of the Invention

The present invention relates to location-based control of the access to data stored on a removable data carrier or contained in a received data file.

Background of the Invention

Communication infrastructures suitable for mobile users (in particular, though not exclusively, cellular radio infrastructures) have now become widely adopted. Whilst the primary driver has been mobile telephony, the desire to implement mobile data-based services over these infrastructures, has led to the rapid development of data-capable bearer services across such infrastructures. This has opened up the possibility of many Internet-based services being available to mobile users.

By way of example, Figure 1 shows one form of known communication infrastructure for mobile users providing both telephony and data-bearer services. In this example, a mobile entity 20, provided with a radio subsystem 22 and a phone subsystem 23, communicates with the fixed infrastructure of GSM PLMN (Public Land Mobile Network) 10 to provide basic voice telephony services. In addition, the mobile entity 20 includes a data-handling subsystem 25 interworking, via data interface 24, with the radio subsystem 22 for the transmission and reception of data over a data-capable bearer service provided by the PLMN; the data-capable bearer service enables the mobile entity 20 to communicate with a service system 40 connected to the public Internet 39. The data handling subsystem 25 supports an operating environment 26 in which applications run, the operating environment including an appropriate communications stack.

More particularly, the fixed infrastructure 10 of the GSM PLMN comprises one or more Base Station Subsystems (BSS) 11 and a Network and Switching Subsystem NSS 12. Each BSS 11 comprises a Base Station Controller (BSC) 14 controlling multiple Base Transceiver Stations (BTS) 13 each associated with a respective "cell" of the radio network. When active, the radio subsystem 22 of the mobile entity 20 communicates via a

radio link with the BTS 13 of the cell in which the mobile entity is currently located. As regards the NSS 12, this comprises one or more Mobile Switching Centers (MSC) 15 together with other elements such as Visitor Location Registers 32 and Home Location Register 32.

When the mobile entity 20 is used to make a normal telephone call, a traffic circuit for carrying digitised voice is set up through the relevant BSS 11 to the NSS 12 which is then responsible for routing the call to the target phone (whether in the same PLMN or in another network).

With respect to data transmission to/from the mobile entity 20, in the present example three different data-capable bearer services are depicted though other possibilities exist. A first data-capable bearer service is available in the form of a Circuit Switched Data (CSD) service; in this case a full traffic circuit is used for carrying data and the MSC 32 routes the circuit to an InterWorking Function IWF 34 the precise nature of which depends on what is connected to the other side of the IWF. Thus, IWF could be configured to provide direct access to the public Internet 39 (that is, provide functionality similar to an IAP - Internet Access Provider IAP). Alternatively, the IWF could simply be a modem connecting to a PSTN; in this case, Internet access can be achieved by connection across the PSTN to a standard IAP.

A second, low bandwidth, data-capable bearer service is available through use of the Short Message Service that passes data carried in signalling channel slots to an SMS unit which can be arranged to provide connectivity to the public Internet 39.

A third data-capable bearer service is provided in the form of GPRS (General Packet Radio Service which enables IP (or X.25) packet data to be passed from the data handling system of the mobile entity 20, via the data interface 24, radio subsystem 21 and relevant BSS 11, to a GPRS network 17 of the PLMN 10 (and vice versa). The GPRS network 17 includes a SGSN (Serving GPRS Support Node) 18 interfacing BSC 14 with the network 17, and a GGSN (Gateway GPRS Support Node) interfacing the network 17 with an external network (in this example, the public Internet 39). Full details of GPRS can be found in the

ETSI (European Telecommunications Standards Institute) GSM 03.60 specification. Using GPRS, the mobile entity 20 can exchange packet data via the BSS 11 and GPRS network 17 with entities connected to the public Internet 39.

The data connection between the PLMN 10 and the Internet 39 will generally be through a firewall 35 with proxy and/or gateway functionality.

Different data-capable bearer services to those described above may be provided, the described services being simply examples of what is possible.

In Figure 1, a service system 40 is shown connected to the Internet 40, this service system being accessible to the OS/application 26 running in the mobile entity by use of any of the data-capable bearer services described above. The data-capable bearer services could equally provide access to a service system that is within the domain of the PLMN operator or is connected to another public or private data network.

With regard to the OS/application software 26 running in the data handling subsystem 25 of the mobile entity 20, this could, for example, be a WAP application running on top of a WAP stack where "WAP" is the Wireless Application Protocol standard. Details of WAP can be found, for example, in the book "Official Wireless Application Protocol" Wireless Application Protocol Forum, Ltd published 1999 Wiley Computer Publishing. Where the OS/application software is WAP compliant, the firewall will generally also serve as a WAP proxy and gateway. Of course, OS/application 26 can comprise other functionality (for example, an e-mail client) instead of, or additional to, the WAP functionality.

The mobile entity 20 may take many different forms. For example, it could be two separate units such as a mobile phone (providing elements 22-24) and a mobile PC (data-handling system 25) coupled by an appropriate link (wireline, infrared or even short range radio system such as Bluetooth). Alternatively, mobile entity 20 could be a single unit such as a mobile phone with WAP functionality. Of course, if only data transmission/reception is required (and not voice), the phone functionality 24 can be omitted; an example of this is a PDA with built-in GSM data-capable functionality whilst another example is a digital

camera (the data-handling subsystem) also with built-in GSM data-capable functionality enabling the upload of digital images from the camera to a storage server.

Whilst the above description has been given with reference to a PLMN based on GSM technology, it will be appreciated that many other cellular radio technologies exist and can typically provide the same type of functionality as described for the GSM PLMN 10.

Recently, much interest has been shown in "location-based", "location-dependent", or "location-aware" services for mobile users, these being services that take account of the current location of the user (or other mobile party). The most basic form of this service is the emergency location service whereby a user in trouble can press a panic button on their mobile phone to send an emergency request-for-assistance message with their location data appended. Another well known location-based service is the provision of traffic and route-guiding information to vehicle drivers based on their current position. A further known service is a "yellow pages" service where a user can find out about amenities (shops, restaurants, theatres, etc.) local to their current location. The term "location-aware services" will be used herein to refer generically to these and similar services where a location dependency exists.

Location-aware services all require user location as an input parameter. A number of methods already exist for determining the location of a mobile user as represented by an associated mobile equipment. Example location-determining methods will now be described with reference to Figures 2 to 5. As will be seen, some of these methods result in the user knowing their location thereby enabling them to transmit it to a location-aware service they are interested in receiving, whilst other of the methods result in the user's location becoming known to a network entity from where it can be supplied directly to a location-aware service (generally only with the consent of the user concerned). It is to be understood that additional methods to those illustrated in Figures 2 to 5 exist.

As well as location determination, Figures 2 to 5 also illustrate how the mobile entity requests a location-aware service provided by service system 40. In the present examples,

the request is depicted as being passed over a cellular mobile network (PLMN 10) to the service system 40. The PLMN is, for example, similar to that depicted in Figure 1 with the service request being made using a data-capable bearer service of the PLMN. The service system 40 may be part of the PLMN itself or connected to it through a data network such as the public Internet. It should, however, be understood that infrastructure other than a cellular network may alternatively be used for making the service request

The location-determining method illustrated in Figure 2 uses an inertial positioning system 50 provided in the mobile entity 20A, this system 50 determining the displacement of the mobile entity from an initial reference position. When the mobile entity 20A wishes to invoke a location-aware service, it passes its current position to the corresponding service system 40 along with the service request 51. This approach avoids the need for an infrastructure to provide an external frame of reference; however, cost, size and long-term accuracy concerns currently make such systems unattractive for incorporation into mass-market handheld devices.

Figure 3 shows two different location-determining methods both involving the use of local, fixed-position, beacons here shown as infra-red beacons IRD though other technologies, such as short-range radio systems (in particular, "Bluetooth" systems) may equally be used. The right hand half of Figure 3 show a number of independent beacons 55 that continually transmit their individual locations. Mobile entity 20B is arranged to pick up the transmissions from a beacon when sufficiently close, thereby establishing its position to the accuracy of its range of reception. This location data can then be appended to a request 59 made by the mobile entity 20B to a location-aware service available from service system 40. A variation on this arrangement is for the beacons 55 to transmit information which whilst not directly location data, can be used to look up such data (for example, the data may be the Internet home page URL of a store housing the beacon 55 concerned, this home page giving the store location - or at least identity, thereby enabling look-up of location in a directory service).

In the left-hand half of Figure 3, the IRB beacons 54 are all connected to a network that connects to a location server 57. The beacons 54 transmit a presence signal and when

mobile entity 20C is sufficiently close to a beacon to pick up the presence signal, it responds by sending its identity to the beacon. (Thus, in this embodiment, both the beacons 54 and mobile entity 20C can both receive and transmit IR signals whereas beacons 55 only transmit, and mobile entity 20B only receives, IR signals). Upon a beacon 54 receiving a mobile entity's identity, it sends out a message over network 56 to location server 57, this message linking the identity of the mobile entity 20C to the location of the relevant beacon 54. Now when the mobile entity wishes to invoke a location-aware service provided by the service system 40, since it does not know its location it must include it's identity in the service request 58 and rely on the service system 40 to look up the current location of the mobile entity in the location server 57. Because location data is personal and potentially very sensitive, the location server 57 will generally only supply location data to the service system 40 after the latter has produced an authorizing token supplied by the mobile entity 20B in request 58. It will be appreciated that whilst service system 40 is depicted as handling service requests form both types of mobile entity 20 B and 20C, separate systems 40 may be provided for each mobile type (this is likewise true in respect of the service systems depicted in Figures 4 and 5).

Figure 4 depicts several forms of GPS location-determining system. On the left-hand side of Figure 4, a mobile entity 20D is provided with a standard GPS module and is capable of determining the location of entity 20D by picking up signals from satellites 60. The entity 20D can then supply this location when requesting, in request 61, a location-aware service from service system 40.

The right-hand side of Figure 4 depicts, in relation to mobile entity 20E, two ways in which assistance can be provided to the entity in deriving location from GPS satellites. Firstly, the PLMN 10 can be provided with fixed GPS receivers 62 that each continuously keep track of the satellites 60 visible from the receiver and pass information in messages 63 to local mobile entities 20E as to where to look for these satellites and estimated signal arrival times; this enables the mobile entities 20E to substantially reduce acquisition time for the satellites and increase accuracy of measurement (see "Geolocation Technology Pinpoints Wireless 911 calls within 15 Feet" 1-Jul-99 Lucent Technologies, Bell Labs). Secondly, as an alternative enhancement, the processing load on the mobile entity 20E can be reduced

and encoded jitter removed using the services of network entity 64 (in or accessible through PLMN 10).

One the mobile unit 20E has determined its location, it can pass this information in request 65 when invoking a location-aware service provided by service system 40.

Figure 5 depicts two general approaches to location determination from signals present in a cellular radio infrastructure. First, it can be noted that in general both the mobile entity and the network will know the identity of the cell in which the mobile entity currently resides, this information being provided as part of the normal operation of the system. (Although in a system such as GSM, the network may only store current location to a resolution of a collection of cells known as a "location area", the actual current cell ID will generally be derivable from monitoring the signals exchanged between the BSC 14 and the mobile entity). Beyond current basic cell ID, it is possible to get a more accurate fix by measuring timing and/or directional parameters between the mobile entity and multiple BTSs 13, these measurement being done either in the network or the mobile entity (see, for example, International Application WO 99/04582 that describes various techniques for effecting location determination in the mobile and WO 99/55114 that describes location determination by the mobile network in response to requests made by location-aware applications to a mobile location center - server- of the mobile network).

The left-hand half of Figure 5 depicts the case of location determination being done in the mobile entity 20F by, for example, making Observed Time Difference (OTD) measurements with respect to signals from BTSs 13 and calculating location using a knowledge of BTS locations. The location data is subsequently appended to a service request 66 sent to service system 40 in respect of a location-aware service. The calculation load on mobile entity 20F could be reduced and the need for the mobile to know BTS locations avoided, by having a network entity do some of the work. The right-hand half of Figure 5 depicts the case of location determination being done in the network, for example, by making Timing Advance measurements for three BTSs 13 and using these measurements to derive location (this derivation typically being done in a unit associated with BSC 14). The resultant location data is passed to a location server 67 from where it

can be made available to authorised services. As for the mobile entity 20C in Figure 3, when the mobile entity 20G of Figure 5 wishes to invoke a location-aware service available on service system 50, it sends a request 69 including an authorisation token and its ID (possible embedded in the token) to the service system 40; the service system then uses the authorisation token to obtain the current location of the mobile entity 20G from the location server 67.

In the above examples, where the mobile entity is responsible for determining location, this will generally be done only at the time the location-aware service is being requested. Where location determination is done by the infrastructure, it may be practical for systems covering only a limited number of users (such as the system illustrated in the left-hand half of Figure 2 where a number of infrared beacons 54 will cover a generally fairly limited) for location-data collection to be done whenever a mobile entity is newly detected by an IRB, this data being passed to location server 57 where it is cached for use when needed. However, for systems covering large areas with potentially a large number of mobile entities, such as the Figure 5 system, it is more efficient to effect location determination as and when there is a perceived need to do so; thus, location determination may be triggered by the location server 67 in response to the service request 68 from the mobile entity 20G or the mobile entity may, immediately prior to making request 68, directly trigger BSC 14 to effect a location determination and feed the result to location server 67.

Further with respect to the location servers 57, 67, whilst access authorisation by location-aware services has been described as being through authorisation tokens supplied by the mobile entities concerned, other authorisation techniques can be used. In particular, a location-aware service can be prior authorised with the location server in respect of particular mobile entities; in this case, each request from the service for location data needs only to establish that the request comes from a service authorised in respect of the mobile entity for which the location data is requested.

As already indicated, Figures 2 to 5 depict only some examples of how location determination can be achieved, there being many other possible combinations of technology used and where in the system the location-determining measurements are made

and location is calculated, stored and used .Thus, the location-aware service may reside in the mobile entity whose location is of interest, in a network-connected service system 40 (as illustrated), or even in another mobile entity. Furthermore, whilst in the examples of Figures 2 to 5, invocation of the location-aware service has been by the mobile entity whose location is of interest, the nature of the location-aware service may be such that it is invoked by another party (including, potentially, the PLMN itself). In this case, unless the invoking party already knows the location of he mobile entity and can pass this information to the location-aware service (which may, for example, may be situation where the PLMN invokes the service), it is the location-aware service that is responsible for obtaining the required location data, either by sending a request to the mobile entity itself or by requesting the data from a location server. Unless the location server already has the needed information in cache, the server proceeds to obtain the data either by interrogating the mobile entity or by triggering infrastructure elements to locate the mobile. For example, where a location-aware service running on service system 40 in Figure 5 needs to find the location of mobile 20G, it could be arranged to do so by requesting this information from location server 67 which in turn requests the location data from the relevant BSC, the latter then making the necessary determination using measurements from BTSs 13.

Although in the foregoing, the provision of location data through the mobile radio infrastructure to the mobile entity has been treated as a service effected over a data-capable bearer channel, it may be expected that as location data becomes considered a basic element of mobile radio infrastructure services, provision will be made in the relevant mobile radio standards for location data to be passed over a signalling channel to the mobile entity.

It is an object of the present invention to provide an improved way of restricting access to electronic content data by using location information.

Summary of the Invention

According to one aspect of the present invention, there is provided a control method for an item of equipment that is provided with particular functionality for using target data on a removable data carrier or in a received data file, the method involving enabling said

particular functionality upon at least a first location condition being satisfied, this condition being tested for by:

(a) obtaining current-location data representing the current location of the equipment;

(b) comparing the current-location data with authorised-location data that is associated with the target data and represents a predetermined authorised location or locality for operation of said particular functionality of the equipment in relation to the associated target data; and

(c) generating a location-match signal upon the comparison step (b) indicating that the equipment is currently located in said authorised location or locality.

According to a second aspect of the present invention, there is provided equipment including particular functionality for using target data provided on a removable data carrier or in a received data file, the equipment further including a control sub-system for enabling said particular functionality upon at least a first location condition being satisfied, the control sub-system comprising, for testing this condition,:

- a location discovery arrangement for obtaining current-location data representing the current location of the equipment;
- a read arrangement for reading from the removable data carrier or received data file authorized-location data representing a predetermined authorized location or locality for operation of said particular functionality of the equipment; and
- a comparison arrangement for comparing the current-location data with the authorized-location data whereby to generate a location-match signal upon this comparison indicating that the equipment is currently located in said authorised location or locality.

According to a third aspect of the present invention, there is provided equipment including particular functionality for using target data provided on a removable data carrier or in a received data file, the equipment further including a control sub-system for enabling said particular functionality upon at least a first location condition being satisfied, the control sub-system comprising, for testing this condition,:

- a location discovery arrangement for obtaining current-location data representing the current location of the equipment;

- a store for storing in association with identity data, authorized-location data representing a predetermined authorized location or locality for operation of said particular functionality of the equipment
- a read arrangement for reading from the removable data carrier or received data file identity information relating to the target data;
- a data retrieval arrangement for using the identity information to access the authorized-location data held in said store in respect of the identity data matching the identity information; and
- a comparison arrangement for comparing the current-location data with the accessed authorized-location data whereby to generate a location-match signal upon this comparison indicating that the equipment is currently located in said authorised location or locality.

According to a fourth aspect of the present invention, there is provided a service system for determining when an item of equipment is located at a location where particular functionality of the equipment is authorised for use in accessing target data provided on a removable data carrier or in a received data file, the service system comprising:

- a communications sub-system for communicating with said equipment both to receive therefrom identity information concerning said target data, and to return to the equipment enablement signals for enabling said particular functionality for accessing the target data;
- a location discovery arrangement for obtaining current-location data representing the current location of the equipment;
- a store for storing in association with identity data, authorized-location data representing a predetermined authorized location or locality for operation of said particular functionality of the equipment;
- a data retrieval arrangement for using identity information received from the equipment via the communication sub-system to access the authorized-location data held in said store in respect of identity data matches the identity information; and
- a comparison arrangement for comparing the current-location data with the accessed authorized-location data whereby to generate a location-match signal upon this

comparison indicating that the equipment is currently located in said authorised location or locality.

According to a fifth aspect of the present invention, there is provided a removable data carrier on which is registered target content data and authorised-location data, the latter representing a predetermined authorized location or locality where access to the target data is permitted.

Brief Description of the Drawings

A method and service-system, both embodying the present invention, for location-based equipment control, will now be described, by way of non-limiting example, with reference to the accompanying diagrammatic drawings, in which:

- **Figure 1** is a diagram of a known communications infrastructure usable for transferring voice and data to/from a mobile entity;
- **Figure 2** is a diagram illustrating one known approach to determining the location of a mobile entity, this approach involving providing the entity with an inertial positioning system;
- **Figure 3** is a diagram illustrating another known approach to determining the location of a mobile entity, this approach being based on proximity of the mobile entity to fixed-position local beacons;
- **Figure 4** is a diagram illustrating a further known approach to determining the location of a mobile entity, this approach involving the use of GPS satellites;
- **Figure 5** is a diagram illustrating a still further approach to determining the location of a mobile entity, this approach being based on the use of signals present in a cellular mobile radio communications system;
- **Figure 6** is a diagram illustrating a first embodiment of the invention , this embodiment involving a removable data carrier; and
- **Figure 7** is a diagram illustrating a second embodiment of the invention, this embodiment also involving a removable data carrier.

Best Mode of Carrying Out the Invention

In certain situations it can be desirable to be able to restrict access to certain information media and data files such that they could only be read at particular locations (inside a secure building, for example). As will be described below, embodiments of the present invention provide ways of achieving this objective by deriving the location of the equipment used to access the information media / data files concerned and comparing this location with predetermined authorized-locations data that specifies where the equipment, or where the media/file, are authorized for use. Where this comparison determines that the equipment (or at least one function of the equipment) can legitimately be used, appropriate enablement signals are generated to enable the corresponding equipment functions.

Current location data about the equipment may be derived by the equipment itself or by a communications infrastructure (e.g. cellular radio network) with which the equipment communicates. As regards the authorised-locations data, this can be:

- held in the equipment (and potentially modifiable under password control);
- embedded in "content" (removable information media, received data file) which the equipment is intended to process in some way at authorised locations;
- held at a remote server to which the equipment must refer; in this case, a reference identifying what authorised-locations data is relevant must be passed to the server (this reference could identify the equipment, a particular user, or the "content" concerned). The identifying reference may be provided from the equipment itself or from the communications infrastructure if known to the latter (which may well be the case if the reference concerns the identity of the equipment or user).

The comparison of equipment current location and the authorized location data can be effected at the equipment itself or at a remote authorization server; in this latter case, the server returns an authorization code only when the equipment location corresponds to the authorized location data.

Conditions additional to location can also be set on equipment enablement.

Figure 6 illustrates a first embodiment of the invention in which a mobile device 80, such as a mobile PC, is only enabled to display a video disc 83 at an authorized location that is

stored on the disc itself. The mobile device 80 includes playback functionality 81 that requires the presence of an enable signal on line 82 for it to display the contents of the disc. Playback functionality includes a location reader 84 operative (regardless of whether or not the enable signal is present) to read the authorized-location data off the disc 83 and pass it to a comparison unit 86 to which is also fed the current location of the device 20 as provided by a GPS system 85. Comparison unit 82 only generates the enable signal when the device current location corresponds to the authorized location data on the disc 83. Preferably, the video disc is encoded in a format that is only interpretable by devices having the location checking functionality built in. The relevant parts of device 80 are preferably of tamper-proof construction so as to prevent an end-user circumventing the location condition placed on access to the target information on the video disc.

Figure 7 illustrates another embodiment where a mobile device 90, such as a mobile PC, is only enabled to decrypt and display a video disc 83 at a location specified in a database 92 associated with an authorisation server 40. The mobile device is equipped with cellular radio functionality enabling it to communicate with the server 40 using a data-capable bearer service of PLMN 10. The identity of the contents of the video disc 83 is read from the disc by the mobile device 90 and supplied to the authorisation server 40. Control process 91 obtains the current location of the mobile device from location server 67 of PLMN 10 and looks up the authorized location of playback of the contents of the video disc 83 by using the disc-contents identity to reference into database 92. Comparison process 93 compares the current device location with the authorized location. If the server finds that an authorized read location for the video-disc contents matches the current location of the mobile device, process 94 returns an enablement code (which may be a decryption key for the video disc contents, this key being held in database 92). Authorization may additionally be made dependent on the identity of the mobile PC or its user. For security reasons, the enablement code is preferably returned encrypted with a public key associated with the mobile device/user. During playing of the video disc, the content identity is arranged to be repeatedly read by device 90 so as to prevent the viewing of a different disc with different content under the authorisation granted for the original disc (this would only be possible if the discs were not encrypted or were encrypted with the same key).

Instead of a video disc 83, the embodiments of Figures 6 and 7 could equally be used in respect of other forms of removable data carriers or received data files (received, for example, via an internet or intranet connection to the equipment). Furthermore, the equipment used to access the information media / data file need not be portable equipment and could, for example, be normal desktop office or home equipment

It will be appreciated that many different embodiments are possible in view of the variety of ways the location information and authorized-locations data can be derived. Furthermore, the desired level of security may determine the details of any particular implementation (in particular, various authentication techniques may need to be used to avoid location information being falsified).

It may be noted that it is possible to store the authorized-location data for the information media / data file in the equipment to be used for access the latter. This could be useful, for example, in restricting access to classified encrypted electronic documents of a company in dependence on the equipment location and classification level of a current document; to this end, the equipment is pre-programmed by the company with authorized location data (corresponding, for example, to company sites and locations within those sites) to be applied to particular document classification levels (the classification level of a document being stored with that document on the information media/file concerned and being read by the equipment). Thus, if the current location of the equipment is such that it is authorized to read documents of a classification level at least as high as that of a current document, then the equipment is enabled to use an appropriate decryption key (for example, stored in the equipment) for reading that electronic document. In this context, the classification level of the electronic document constitutes its identity.

Whilst in the described embodiments the location data has been expressed in terms of absolute location data, it would be possible also to use relative location data and also semantic location data (for example, the authorised locations could be specified as all premises of a particular company, in which case there would need to be a translation of this

semantic location data to real world locations through, for example, a database that specifies the absolute locations of the company's current premises).

In the Figure 7 embodiment, communication with the authorisation server 40 is described as being via a cellular radio connection. It would, of course, also be possible to used a wired connection (such as a LAN connecting to the Internet) with the current location of the device concerned being obtained by any appropriate manner.

Where a piece of equipment has multiple functional units, different functions of the equipment can be locationally limited to differing extents.

It is to be understood that the present invention is not limited to the specifics of the mobile entity and communication infrastructure and location discovery means shown in Figures 6 and 7, and the generalisations discussed above in relation to Figures 1 to 5 regarding these elements apply equally to the operational context of the described embodiments of the invention. Furthermore, whilst the service system 40 is shown in Figure 7 as connected to the public Internet, it could be connected to a GPRS network 17 of PLMN 10 or to another fixed data network interfacing directly or indirectly with the network 17 or network 39.